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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/685,037	10/14/2003	Robert Boyd Barbee	USC12.CON1	4875
6980	7590	07/14/2004	EXAMINER	
TROUTMAN SANDERS LLP BANK OF AMERICA PLAZA, SUITE 5200 600 PEACHTREE STREET, NE ATLANTA, GA 30308-2216			WYROZEBSKI LEE, KATARZYNA I	
			ART UNIT	PAPER NUMBER
			1714	

DATE MAILED: 07/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/685,037

Applicant(s)

BARBEE ET AL.

Examiner

Katarzyna Wyrozewski

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 14 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 40-59 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 40-59 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

In view of interview conducted on 6/30/2004 the examiner issues supplemental office action with time restarted. All the rejections of record are incorporated here by reference.

The examiner acknowledges receipt of preliminary amendment dated 10/14/2003, which cancels claims 1-39. claims 40-59 are pending.

***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

2. Claim 46 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 46 contains limitation of tactoids having thickness of less than about 20 nm. The limitation of "less than about" renders claim indefinite, since it is not clear if the thickness is less than 20 nm or if the thickness is "about" 20 nm. Term "less than" excludes tactoids thicker than 20 nm, while term "about" allows thickness higher than 20 nm.

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Claim 46 further fails to narrow down the limitations of claim 40 since in claim 40 the amount of the clay component in form of individual platelets is at least 75 % and in claim 46 the amount of claim in form of individual platelets is at least 50 %.

### ***Specification***

Applicants are requested to update their priority information in the first paragraph of the specification, since the application number 09/452,318 has been assigned a patent number.

### ***Double Patenting***

3. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

4. Claims 40-59 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-39 of U.S. Patent No. 6,653,388 ('388) to

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BARBEE. Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following explanation.

The patented invention of BARBEE, just like present invention, claims polymer-clay nanocomposite comprising melt processible polymer and intimate mixture of at least two swellable smectite layered clays.

The amount of clay in the nanocomposite is in a range of greater than 0 to about 25 pbw and at least 50 % of the clay is in form of platelets with tactoids having thickness of no more than 20 nm.

Clays are intercalated with ammonium compounds that include alkoxyated ammonium compounds and alkyl ammonium compounds.

Intercalated clay is incorporated into the melt processible polymer to form articles such as bottles, films and sheets.

The polymers include polyamides, polyesters, EVOH and the like. The process of BARBEE incorporates clay into melt processable polymer, wherein the mixture of the two clays is prepared with aid of a solvent.

In the light of the above disclosure, already published disclosure of BARBEE teaches the claims of the present invention. Therefore one of ordinary skill in the art would arrive at the present invention while practicing the claims of BARBEE.

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***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 40, 41, 43, 44, 46-49, 54-56, 58, 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over ROSS (US 6,380,295).

The prior art of ROSS discloses composition for clay nanocomposites comprising one or more smectite clays, ammonium cation and organic compound.

Clays of ROSS are smectite swellable clays having cation exchange capacity of 15-90 meq/100 grams (col. 5, lines 20-22). Clays can be selected from sodium montmorillonite, bentonite, hectorite, saponite, beidelite, stevensite and the like (col. 5, lines 5-8). The amount of clay in the composite is 1-30 wt% (col. 9, lines 53-55).

Ammonium compound has 4 substituents. R1-R2 that can be selected from alkyl chains having 1-30 carbon atoms, alkoxyated groups, oxazoline, groups and the like (col. 6, lines 13-38).

Polymers in the composition of ROSS include polyamides, polyesters, polycarbonates, polyolefins and the like (col. 8, lines 5-25).

The process of making clay nanocomposite, includes first incorporating into clay component in presence of water ammonium compound to facilitate intercalation (example 1). So modified clay was then melt-processed with polymer (see example 2). Table I of ROSS discloses various types of polymers as utilized in the examples.

The prior art of ROSS indicates that the clay component undergoes substantially complete exfoliation, which further signifies that outside of few particles all clay component is in the form of single platelet (col. 9, lines 1-2). Such also signifies lack of tactoids that is further enabled by the claims of the present invention.

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The exfoliation of the clay results in formation of clay platelets, which are of nano-size and can be utilized in conjunction with polymers.

In the light of the above disclosure it would have been obvious to one having ordinary skill in the art at the time of the instant invention to utilize the composition of ROSS and thereby arrive at the present invention. The prior art of RASS enables one of ordinary skill in the art to utilize more than one type of the smectite type clay, therefore the composition and the process of ROSS would also involve use of more than one type of smectite type clay.

9. Claims 40-44, 46, 54-59 are rejected under 35 U.S.C. 103(a) as being unpatentable over FRISK (US 5,916,685).

The prior art of Frisk discloses composition utilized in making a container. The container comprises a layer a containing matrix polymer and layered silicate.

According to the prior art of Frisk, the silicate can be selected from the group consisting of montmorillonite, saponite, beidelite, hectorite and mixtures thereof in the amount of. Therefore, the prior art of Frisk encompasses not only one, but also two or more types of the smectite clay dispersed in the matrix resin. The amount of the clay component of the nanocomposite of Frisk is 0.1-10 % by weight and wherein the cation exchange capability is an inherent value of the smectite clays, and support for such property can be found in col. 5 of the prior art of Frisk.

The matrix polymer according to claims of the prior art of Frisk includes PET or polyamide. Clay is first intercalated with monomer and upon polymerization it exfoliates.



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Therefore it nanocomposite will inherently be in a single platelet form with some tactoids or aggregates still in tact.

According to the prior art of Frisk, the particles of the smectite clay have thickness of 9-100 nm and the aspect ratio of 100-2000.

In the light of the above disclosure it would have been obvious to one having ordinary skill in the art at the time of the instant invention to utilize the composition of the prior art of FRISK and obtain the invention of claims rejected above.

10. Claims 41, 42, 47-49, 53-59 are rejected under 35 U.S.C. 103(a) as being unpatentable over either ROSS (US 6,380,295) or FRISK (US 5,916,685) in view of LAN (US 6,232,388).

The discussion of ROSS or FRISK from paragraphs 8 or 9 of this office action is incorporated here by reference.

The difference between the present invention and the disclosure of the prior art of ROSS or FRISK is use specific polyamide and its properties and in addition in case of FRISK ammonium compounds.

The prior art of LAN discloses use of polyamide nanocomposites in making layered structures having good barrier properties.

The polyamide utilized in the disclosure of FRISK is MXD6 polyamide or poly xylylene adipamide (Abstract). Additional polymers such as polyesters and other polyamides are listed in col. 16, lines 3-15 of the prior art of LAN.

The ammonium compounds of LAN include alkyl ammonium compounds as well as alkoxyated alkyls (col. 9, lines 35-62).

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Just like in the paragraphs above, the prior art of LAN discussed exfoliation of the clay platelets to obtain the nanocomposite with good gas barrier properties. The addition of the ammonium compounds in the disclosure of LAN increases the basal spacing of the clay platelets thereby affording easier intercalation of the polymer matrix between clay platelets and further exfoliation. Therefore with use of the ammonium compound of LAN the net result is the same as that of the prior art of FRISK.

In the light of the above disclosure it would have been obvious to one of ordinary skill in the art at the time of the instant invention to combine the disclosure of the prior art of ROSS or FRISK with the composition of LAN and thereby obtain the claimed invention. Utilizing polymers of LAN in contemplated in the composition of ROSS by genus of polyamide and use of ammonium compound in FRISK would have the same net result as that of the prior art of LAN.

11. Claims 45, 50-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over ROSS (US 6,380,295) or FRISK (US 5,916,685) in view of LAN (US 6,232,388) as applied to claims 40-44, 46-49, 53-59 above, and further in view of NAE (US 5,429,999).

The discussion of the disclosures of the prior art of ROSS, FRISK and LAN from paragraphs 8-10 of this office action is incorporated here by reference.

The difference between the present invention and the disclosure of the prior art of ROSS, FRISK and LAN is use of alkoxylated salts that can be utilized as intercalating agent for clay component.

With respect to the above difference, the prior art of NAE discloses composition comprising clay and intercalating agent.

The intercalating agent for the clay is ammonium salt containing poly alkoxy substituents as depicted in col. 9, lines 10-18. In fact the prior art of NAE discloses that a combination of ammonium compounds such as the polyalkoxylated one with alkyl ammonium compound can also be utilized (Abstract).

The alkoxylated ammonium compounds of NAE include octadecyl (bis-polyoxyethylene[15]) methyl ammonium chloride (col. 9, lines 39-50). The alkyl ammonium compounds have at least one aliphatic chain having 12-22 carbon atoms and the other substituents have 1-22 carbon atoms (col. 8, lines 10-15). The description of these ammonium compounds encompasses the ammonium compounds claimed in the present invention.

The compounds of the prior art of NAE are utilized as intercalants capable of undergoing cation exchange with the ionic species of the clay and thereby increasing the basal spacing between clay platelets. Using these ammonium compounds instead or in conjunction with ammonium compounds of ROSS or LAN would have the same outcome.

In the light of the above discussion it would have been obvious to one having ordinary skill in the art to utilize the ammonium compounds of NAE in the composition of ROSS, FRISK and LAN and thereby obtain present invention. Using these compounds would have the same effect on the clay component as those described in ROSS or LAN.

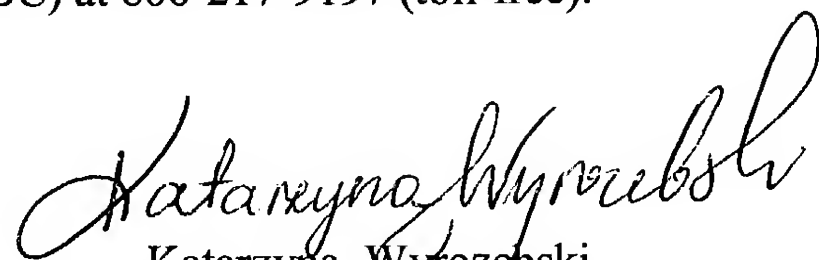
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12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The disclosure of LAN (US 6,391,449) although very relevant to the present invention does not qualify as a prior art for date purposes.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katarzyna Wyrozebski whose telephone number is (571) 272-1127. The examiner can normally be reached on Mon-Thurs 6:30 AM-4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan can be reached on (571) 272-1119. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Katarzyna Wyrozebski  
Primary Examiner  
Art Unit 1714

July 8, 2004